Appendix E
WETLANDS AND ENVIRONMENTALLY SENSITIVE AREAS

FACTORS AFFECTING WETLANDS AND ENVIRONMENTALLY SENSITIVE AREAS

Factors which influence wetland systems and environmentally sensitive lands include hydrology, fire, geology and soils, climate, and ecological succession. This section presents an overview of each of these factors.

Hydrology

Hydrology is the single most important determinant for the establishment and maintenance of specific types of wetlands and wetland processes (Mitsch and Gosselink, 1986). Hydraulic inflows and outflows, such as precipitation, surface runoff, ground water inputs, and in some cases, tides and river flooding, provide the energy to transport nutrients and other organic material to and from wetlands. Water depth, hydroperiod, flow patterns, stage, duration, frequency of flooding, and water quality all influence the biochemistry of wetlands and ultimately, the species composition and type of wetland community that develops. The hydrology of a wetland acts both as a limit and a stimulus for determining the numbers, types (species), and growth rates of flora and fauna that can live within a specific wetland. For example, the growth rates of pine trees appear to be affected by water table depths. Slash pine growth rates in flatwoods generally increase in proportion to the depth to the water table, indicating the inhibitory effect of excessive moisture (Duncan and Terry, 1983). At the other extreme, tree growth can be limited by a lack of available moisture during the dry season (Haines and Gooding, 1983). Hydrology also strongly affects aquatic primary production, organic accumulation, and the cycling of nutrients (Mitsch and Gosselink, 1986).

Precipitation

The Lower West Coast (LWC) Planning Area experiences wide variations in annual rainfall, resulting in flooding and extended drought periods. During heavy rainfall years, there is overland flow and discharge to the ocean. During extended drought years, however, the natural system is stressed by saltwater intrusion, increased frequency of fires, loss of organic soils, and invasion of wetlands by exotics. The region averages about 52 inches of rainfall annually, with approximately two-thirds falling during the summer months (Duever et al., 1986). During the dry season (November-April), precipitation is governed largely by large-scale winter weather fronts which pass through the region roughly every seven days (Bradley, 1972). Rainfall from these fronts exhibit a uniform distribution pattern as compared to precipitation derived from the highly variable, convective-type thunderstorms characteristic of the wet season (May-October).

Evapotranspiration

Evapotranspiration (ET) is the combined process of evaporation from land and water surfaces, and transpiration from plants. ET rates vary as a function of solar radiation, air and water temperature, relative humidity, wind velocity and duration, and the

type and density of vegetation (Duever et al., 1986). In South Florida, ET ranges from 70 to 95 percent of annual rainfall. During the dry season and drought years, ET exceeds rainfall inputs (Klein et al., 1975). Temperature is often regarded as the most important factor controlling ET. Minimum ET rates occur during the winter months of December and January, with highest values experienced during the spring months of April and May. Typical ET values for South Florida range from 40 to 45 inches a year, up to a maximum of 60 inches a year (Parker et al., 1955). As a result, ET plays a very important role in the development of any hydrologic model that might be developed for a particular wetland system and is usually the most difficult parameter to estimate.

Hydroperiod

Hydroperiod refers to the annual period of water level inundation, specifically the length of time (duration) that a wetland contains water above ground level. **Figure E-1** presents examples of typical hydroperiods experienced by three different South Florida plant communities. Duever et al. (1986) reports that hydroperiod is the dominant factor controlling both the existence, plant community composition and succession of South Florida wetland systems. Hydroperiod is often expressed in terms of the range of the number of days that a wetland is normally inundated. For example, in the Big Cypress Preserve, Duever et al. (1986) reports that freshwater marshes are usually found on sites having a hydroperiod of 225 to 275 days per year, as compared to a pond system which is inundated year round. Each wetland type is thought to have a hydrologic signature that describes the rise and fall of water levels from year to year (Mitsch and Gooselink, 1986). Duever et al. (1986) found that work conducted at Corkscrew Swamp “has clearly shown that the distribution of undisturbed upland, marsh, swamp and shallow aquatic habitats are largely a function of a site's hydroperiod.” In contrast, O'Brien and Motts (1980) state that from a hydrological point of view, the most significant feature of a wetland is the level of the ground water table. They point out that the depth to the ground water table is more significant than the hydroperiod or time the wetland is flooded.

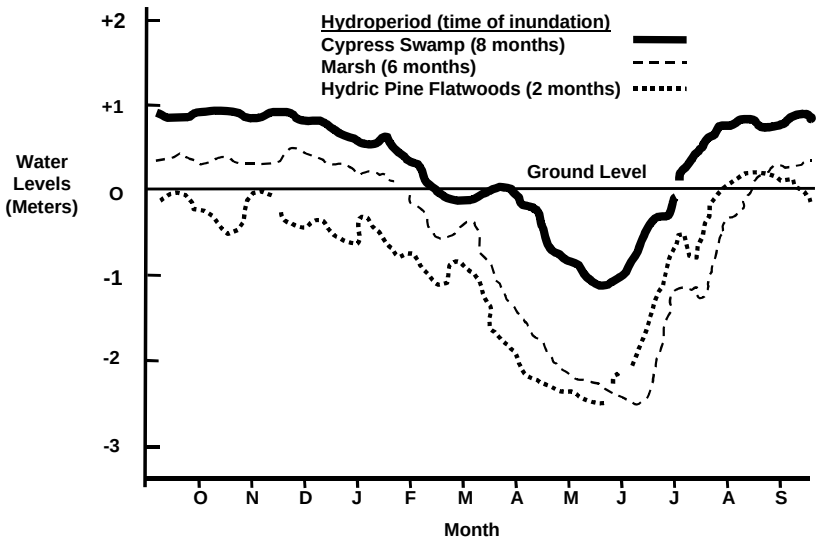

Figure E-1. Hydrographs and Hydroperiod Ranges for Three Different South Florida Vegetation Types (Duever et al., 1986).

Water Level Depth and Timing

In South Florida's freshwater wetlands, wading bird nesting success is highly dependent on present and past water level conditions, which influence the amount and availability of wading bird prey items, such as crayfish and small forage fish (Kushlan, 1976, 1978, 1979, 1980, 1986; Powell, 1987; Frederick and Collopy, 1988). Ecological studies of Southwest Florida wetlands have found a direct relationship between numbers of wading bird breeding attempts and the amount of rainfall preceding the breeding season (Ogden et al., 1980, 1987). Kahl (1964) found that the timing and initiation of wood stork breeding attempts was predictable from the measurement of marsh surface water levels. Kushlan et al. (1975) found that wading bird nesting success was directly related to the rapid winter/spring recession of water levels (drying rate) of South Florida wetlands. Therefore, maintenance of appropriate water depths and timing of wetland water level fluctuations is a critical factor in determining wading bird nesting success.

Topography

In general, wetlands in temperate and tropical regions tend to develop in areas of low topographic relief and high rainfall inputs. Topography also controls the shape and size of watersheds, and affects the timing and quantity of runoff. Topography is also an important factor in controlling the vertical and horizontal extent of seasonal water level

fluctuations within a wetland. In the Big Cypress Swamp, Duever et al. (1986) found that wetlands dominate much of South Florida because: (1) the flat topography reduces runoff to a minimum, (2) high rainfall during the warm part of the year compensates for high ET losses, and (3) low ET rates during the cool part of the year approximates rainfall inputs. At the site-specific level, wetlands are determined by the depth and duration of inundation, which in turn are influenced by site microtopography (differences in water depth of only a few centimeters), soil type, and vegetation cover (Duever et al., 1986).

Vegetation Type

Vegetation type can affect the hydrologic cycle of a wetland, primarily through ET. Vegetation also influences water movement and water quality. Plant leaves, leaf litter and attached periphyton (algae) communities tend to impede water flow which: (1) increases the period of inundation, (2) reduces surface water runoff and erosion, (3) allows more time for aquifer recharge, and (4) assimilates nutrients and chemical exchanges between the soil vegetation and water (Duever et al., 1986).

Tropical Storms and Hurricanes

Hurricanes, tropical cyclones which generate winds in excess of 75 miles per hour, are recurrent events in South Florida and are important physical processes which affect the regional ecology (Craighead and Gilbert, 1962). Southwest Florida has been identified by the National Weather Service as one of the most hurricane-vulnerable areas of the United States. Hurricanes normally cause the greatest amount of damage when wind velocities average greater than 111 miles per hour. Storms of this magnitude have passed within 100 miles of Fort Myers on the average of once every five-and-one-half years from 1900 to 1985 (SWFRPC, 1990).

Coastal flooding from tropical storms or tropical depressions occur commonly within the LWC Planning Area, causing flooding in low-lying areas, along barrier islands, and near river and bay systems (SWFRPC, 1990). Although these storms are destructive to life and property, they appear to be an important component of the region's natural hydrological cycle, often following several drought years to replenish surface and ground water sources. These storms also appear to be an important source of fresh water and nutrient inputs into Florida Bay (Meeder and Meeder, 1989).

Fire

Fire is also an important factor controlling the species composition, distribution and succession of wetland communities in the LWC Planning Area. Within the constraints of wetland hydrology, fires occur with variable frequency and severity affecting plant succession.

Theoretically, hardwood hammocks represent the climax plant community for South Florida (Alexander and Crook, 1973; Wharton et al., 1977; Duever, 1984). Hammocks develop when fire is absent or infrequent, and organic soils are allowed to

build up over time to support the succession of hardwoods (**Figure E-2**). However, fire is a common component of the South Florida landscape. In the Everglades, fires occur on the average every seven years. Few areas escape fire; thus hammocks are relatively uncommon and occur only on elevated sites where fire is infrequent. Most sites high enough to support hammocks are occupied by pine flatwoods, which are tolerant of periodic fire (Duever, 1984).

Wetlands are subject to fires during the dry season. Marshes that dry out and burn with enough frequency do not allow the establishment of woody plants such as wax myrtle and cypress forests. Cypress dominated wetlands occur on wetter organic soils that burn less frequently. Before man settled the region, the majority of fires were caused by lightning strikes during the wet season. As more people moved to the region, fires became suppressed with controlled burns occurring during the winter dry season. These fires are typically more severe and extensive, since they occur during the dry season when wetland soils are dry.

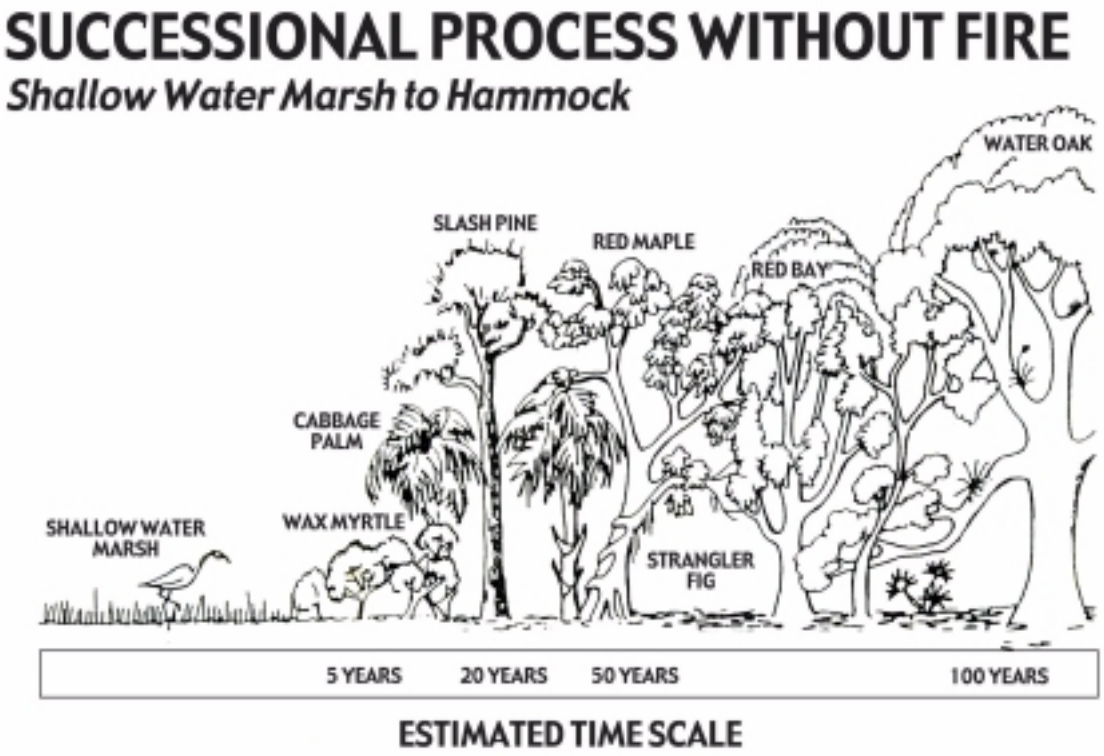

Figure E-2. South Florida Successional Pattern without Fire: Shallow Water Marsh to Hammock (Wharton et al., 1977).

Geology and Soils

The primary geological feature that controls regional hydrology is the permeability of the underlying rock. Limestone with deposits of quartz sand, clay and shell comprise the underlying aquifer. A more detailed description of the region's geology and underlying aquifer system is found in Chapter 3 of the Support Document.

Two primary factors which affect the hydrogeology of wetlands are the porosity and permeability of its underlying soils (Duever, 1988). A highly porous soil can hold or store large amounts of water, while a highly permeable soil allows water to flow to the underlying aquifer. The high capillary action of peat or clay soils enable wetlands to store large quantities of water, somewhat similar to how a sponge takes up water.

Some wetlands contain perched water tables. A perched water table exists where a saturated soil layer is found above a water table and is separated from it by an unsaturated zone (Freeze and Cherry, 1979). This can occur where a relatively impermeable clay or organic soil layer is present near the ground level and restricts the downward movement of water. Perched water tables come in various sizes and can influence surface water levels over large areas or have only local, temporary effects (Duever, 1988). A common misconception is that wetlands can only occur on sites containing a perched water table. Although this may be the case in some areas, Duever's (1988) experience in Southwest Florida indicates that wetland water levels coincide with the regional water table. Situations which at first appeared to be indicative of a perched water table turned out to represent unusual or transient hydrologic conditions.

Climate

In addition to hydrology and fire, climate also plays an important role in controlling plant community succession. The areal extent, species composition, and existence of wetlands are all affected by long-term climatic changes. In addition to normal cyclic drought and flood conditions, long-term cycles have the ability to produce gradual, but nevertheless, major shifts in the normal annual range of hydrologic conditions. As climatic cycles become wetter, wetlands tend to cover larger areas of the landscape. Wetland communities also tend to become more diverse as a result of the presence of greater ranges of hydroperiods on different topographically contolled sites. A wetter climate may also increase the rate of peat accretion in wetlands, thus encouraging the development of edaphic plant communities. Long-term drier conditions may produce the opposite effects. A wetter or dryer climate may also affect the frequency of fire, shifting plant community succession. A major difficulty in managing wetlands is the inability to distinguish between shifts in hydrologic conditions that result from man's activities and those that result from the periodic reoccurrence of natural events or long-term shifts in climate (Duever, 1984).

Succession

Overdrainage of wetlands and reduction of hydroperiod length directly influences the direction of plant community succession within a wetland. McPhearson (1973) reported that “differences of only a few inches in depth or changes in period of inundation will determine, in time, what plant communities are present [in the Everglades].” Numerous investigators have documented changes in the species composition of South Florida plant communities resulting from altered water level conditions (Davis, 1943; Loveless, 1959; Kolipinski and Higer, 1969; Dineen, 1972, 1974; Alexander and Crook, 1973, 1988; Schortemeyer, 1980; Worth, 1983). Duever et al. (1976) used fire frequency

and hydroperiod data to establish a basis for the occurrence of plant community succession in Corkscrew Swamp. This relationship is presented in **Figure E-3**. The successional relationships of South Florida wetland and upland plant communities have also been discussed by Alexander and Crook (1973), Craighead (1971), Davis, (1943), Wharton et al. (1977), and Duever, et al. (1986). These data are useful for making a general assessment of the direction that succession may take as a result of increasing or decreasing hydroperiod in a Southwest Florida wetland.

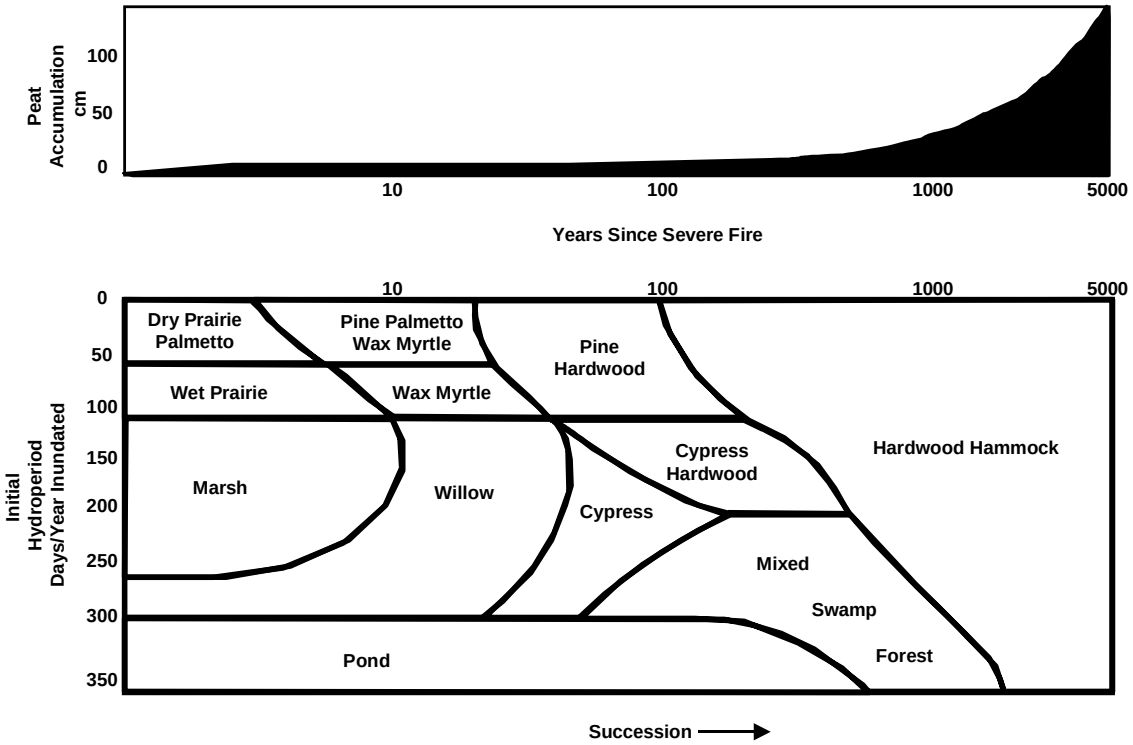

Figure E-3. Successional Patterns and Rates within South Florida Inland Plant Communities (Duever et. al., 1984).

REGIONAL ENVIRONMENTAL ISSUES

Loss of Wetlands

According to the U.S. Fish and Wildlife Service (1990), Florida has lost over 9.3 million acres of wetlands between 1780 and 1985, a 46 percent loss. During the 1970s and 1980s, despite strict environmental regulations, Florida lost, on average, over 26,000 acres of wetlands annually, which is the equivalent of losing 70 acres of wetlands each day. Almost all of these losses are the result of conversion of wetland to agriculture, urban and other built-up areas (Frayer and Hefner, 1991).

In Southwest Florida, large-scale loss of wetlands occurred during the 1960s and 1970s. Urban and agricultural development has affected both the quantity and quality of remaining wetlands. In Lee County, continued urban growth has altered the county's natural systems over the past 50 years. In the northwest portion of the Lee County, the peninsula now occupied by the city of Cape Coral, originally consisted of sloughs, marshlands, and seasonal ponds. Nearly all of the original habitat has been lost to development. Lehigh Acres, another large-scale residential development located in the eastern part of the county, has resulted in the ditching and draining of thousands of acres of the original wetland/upland mosaic. Other parts of the county have also been converted to cropland and improved pasture.

In Collier County, a single large development, Golden Gate Estates, attempted to drain 110,000 acres of pristine forested and emergent wetlands. This project dug 183 miles of canals, constructed 813 miles of roads, and sold over 50,000 individual lots to buyers worldwide (Frayer and Hefner, 1991). Construction of two primary canal systems, the Golden Gate Canal and the Faka Union Canals, disrupted natural drainage patterns and subsequently lowered ground water levels to control flooding and make land suitable for development (Klein et al., 1970; Carter et al., 1973; McPherson et al., 1976). Along the coast of Collier County, south of Naples, a large resort community was built on Marco Island. Construction of this community converted approximately 5,300 acres of mangroves and uplands to finger canal subdivisions. Collier County has also experienced a large amount of growth along its northern coastal area. This growth has the greatest impact on the estuarine communities affected by the alteration of both the quantity and quality of the freshwater runoff they receive. Construction of Alligator Alley (State Road 84), Tamiami Trail (U.S. 41), I-75 and State Road 29 have all impacted historical surface water flow patterns throughout the LWC Planning Area. Heavy use of these roads is a threat to several species of endangered wildlife, including the Florida panther.

The Corkscrew Regional Ecosystem Watershed (CREW) lands represent more than 50,000 acres of environmentally sensitive wetlands and uplands located in Collier and Lee counties. The CREW lands contain five major wetland systems: (1) Flint Pen Strand, (2) Corkscrew Marsh, (3) Corkscrew Swamp Sanctuary, (4) Bird Rookery Swamp and, (5) Camp Keis Strand. This area probably represents the largest remaining hydrologically intact wetland ecosystem in South Florida and provides important wildlife habitat to a number of rare, threatened, and endangered species.

Potential impacts to CREW include: (a) the possibility of lowered ground water tables and impacts to wetlands as a result of county and municipal wellfield development within the watershed, and (b) lowered water table elevations, degraded water quality, and associated wetland impacts caused by the expansion of the citrus and vegetable industries. If properly managed, these lands have the potential to provide a number of benefits to the region. Preliminary data suggests that CREW may offer some degree of water supply for Lee and Collier counties, along with the potential for providing drainage, flood storage and water quality improvements for surface waters discharged to downstream estuaries. The District is currently conducting a hydrologic evaluation of the CREW watershed.

Relocation of Citrus to Southwest Florida

In the early 1980s, a series of devastating freezes caused serious damage to Central Florida's citrus industry. As a result, many citrus growers have recently migrated to Southwest Florida, seeking to reduce the risk of freeze damage to their crop. This has resulted in a major shift in the geographical distribution of citrus within Florida. Most of this new citrus development is occurring within Hendry County, western Glades, eastern Lee and Charlotte, and northern Collier counties. In fact, Hendry County now ranks as Florida's number one citrus county based on the number of trees in the ground and third in total citrus acreage.

Impacts on Wetlands

Citrus development requires specific drainage of the land in order to maintain appropriate soil moisture in the root zone. Much of the east-central portion of the LWC Planning Area is currently cattle rangeland (improved and unimproved pasture and native rangeland). The drainage requirements for rangeland, however, are significantly different from those required to operate a citrus grove. Pasture and rangeland are typically drained by shallow ditches placed at wide intervals because native grasses can survive long periods of flooding. In contrast, citrus groves are very sensitive to saturated water table conditions and require rapid drainage. As a result, the typical citrus operation requires a rather elaborate and responsive drainage/irrigation system, which includes high capacity wells, pumps, reservoirs, ditches, levees, and dikes. Impacts caused by the drawdown of the water table beneath adjacent wetlands, as with all uses, is a concern. However, impacts to wetlands are minimized through the permitting process.

Impacts on Uplands

Based on the magnitude and scale of citrus development within this area, there is a potential that this development could replace some of the remaining upland communities such as flatwoods and xeric scrub habitats that are native to the region. Conversion of large areas of uplands to citrus within Hendry, Lee and Collier counties may significantly affect the regional ecosystem and its remaining wildlife habitat, which borders two federally protected areas (i.e., the Big Cypress National Preserve, Everglades National Park, and the Florida Panther National Wildlife Refuge). Some of this development is occurring in areas occupied by threatened or endangered species such as the Florida panther, black bear, red-cockaded woodpecker, gopher tortoise, gopher frog, or Florida

scrub jay. As illustrated in **Figure E-4**, this citrus development is occurring in a portion of the Florida panther's range. Listed species are also considered in the CUP program.

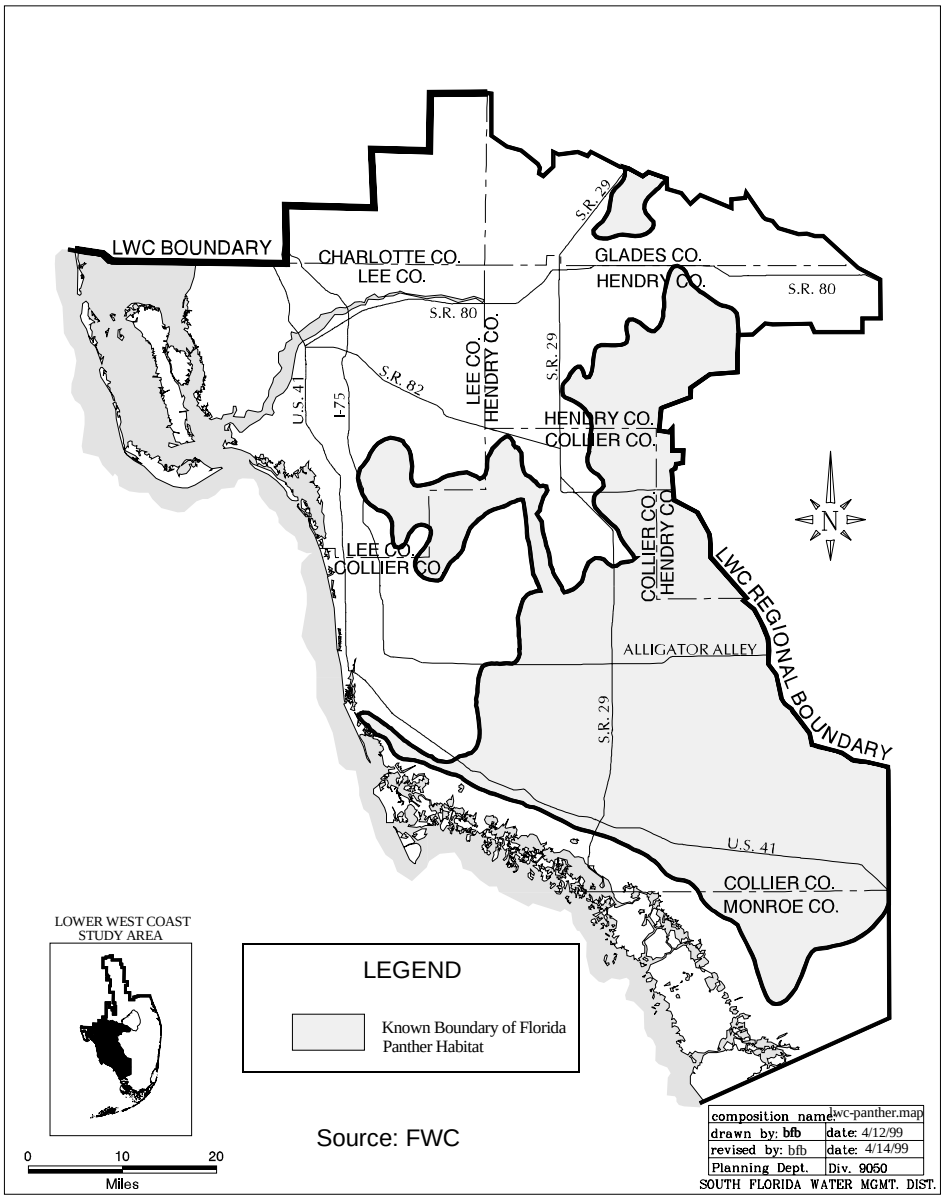

Figure E-4. Florida Panther Habitat in Southwest Florida.

Large-scale citrus development has the potential to effect the natural hydrology of the area, although impacts will be minimized through the permitting process. In addition, fertilizers and pesticides are used in citrus grove operations. If transported offsite in drainage waters, these fertilizers and pesticides have the potential to become contaminants in downstream receiving waters. Current surface water management regulations require water quality and quantity considerations as part of the approval process for development. In addition, current CUP regulations require low volume, high efficiency irrigation techniques. These requirements provide advantages over older methods.

Impacts of Ground Water Drawdowns on Wetlands

Expansion of existing county and municipal wellfields in central Collier, southeastern Lee and Hendry counties, and the associated effects of lowering regional ground water tables, due to water use and drainage, is a concern for existing wetland systems in the LWC Planning Area. However, these concerns are minimized through the permitting process.

Studies are being conducted to better describe potential impacts of wellfield drawdowns (public water supply and agriculture) on wetland systems in the LWC Planning Area, specifically the depth which the water table can be lowered before an impact can be detected within a wetland. A majority of available information has been derived from municipal wellfield drawdown studies.

The effects of municipal wellfield drawdowns on wetlands have been well documented by the Southwest Florida Water Management District (Rochow, 1982, 1983, 1984, 1985; Rochow and Dooris, 1982; Dooris et al., 1990; Watson et al., 1990; Rochow and Rhinesmith, 1991). Over a 15-year period, the SWFWMD has produced more than a dozen technical reports from their wellfield monitoring program concerning the effects of ground water withdrawals on wetland ecosystems. In general, these data indicate that long-term wellfield drawdowns greater than one foot result in "unacceptable ecological change" to wetland communities. These changes (from Dooris et al., 1990) include the following:

- Invasion or establishment of terrestrial plant species creating a "disturbed" appearance and potentially allowing for invasion by exotics
- In severe cases, lowered water table elevations have caused cypress tree mortality and loss of canopy cover
- Increased susceptibility to damage by fire and increased numbers of destructive fires causing changes to community structure
- Loss of organic soils and increased soil subsidence
- Loss of wildlife habitat and wildlife resources

Hydrological and biological monitoring of the Starkey Wellfield has shown that a 0.6 foot water table drawdown corresponded to a noticeable replacement of wetland plant species with those more adapted to upland sites (Rochow, 1989).

In the LWC Planning Area, relatively little work has been directed towards determining the effects of wellfield drawdowns on wetland ecology. The majority of available information has focused upon the ecological impacts of lowered water tables caused by drainage canals. In a study of the Big Cypress Swamp, Carter et al. (1973) described the impacts to cypress wetlands from drainage. Burns (1984) studied the effect of declining water levels within a Fakahatchee Strand cypress community. Results showed that lowering of the water table by an average of 50 cm (1.6 ft.) significantly decreased

biomass and net production of the cypress strand. Within this same strand system, Carter et al. (1973) and Burns (1984) found a ten-fold decrease in primary productivity, extensive thinning of the cypress forest canopy, and a reduction in the rate of forest litter decomposition, leading to buildup of fuel for destructive wildfires. Related observations in the Big Cypress Swamp indicate that extensive dewatering of certain areas of the swamp over the past three decades has led to widespread invasion of cypress communities by slash pine, red maple and red bay. In areas that were previously lumbered and burned, willow is the dominant canopy species for decades to come (Duever et al., 1984). In Southeast Florida, recent data published by Hofstetter and Sonenshein (1990) showed vegetative changes that occurred from 1978 through 1986 in an Everglades wetland (Northwest Wellfield, Miami-Dade County). Results of the study show that wellfield drawdowns shorten hydroperiod, decease herbaceous marsh vegetation in favor of woody vegetation and allow for invasion by melaleuca.

Loss of Aquatic Productivity

Wetlands are known as one of nature's most productive ecosystems. For the greater portion of the year, wetlands are flooded and therefore function essentially as an aquatic system. Typically in Southwest Florida, 75 to 85 percent of the annual precipitation occurs during the months of June through October. Since Southwest Florida wetlands depend upon rainfall as their major source of inflow water, water levels within wetlands systems closely follow seasonal rainfall patterns. Maximum water levels occur near the end of the wet season (October - November) while water levels generally decline during the dry season, reaching lowest levels during April and May. The majority of animals which inhabit Southwest Florida are adapted to this annual cycle. The reproductive success of several key species is closely tied to the rate of water level recession and the concentration of food resources that occurs during the dry season (Ogden et al., 1987; Robertson and Kushlan, 1974).

The presence of surface water within a wetland is essential for maintaining wetland aquatic productivity, i.e., the growth and reproduction of aquatic organisms such as insects, small forage fish, amphibians, crayfish, freshwater shrimp, snails, and other invertebrates that form the basis of the food chain for higher trophic level organisms such as amphibians, reptiles, wading birds and raptors which utilize these wetlands (Kahl, 1964; Kushlan, 1976, 1978; Frederick and Collopy, 1988). Overdrainage of wetlands by ground water withdrawals or surface drainage directly impacts this annual cycle by reducing wetland size, as well as the amount, number and kinds of microorganisms produced by wetlands. Therefore, large-scale drainage of wetlands has a great potential to impact the regional food supplies, breeding and nesting areas for many species of wildlife.

Decrease in Wetland Size

The most obvious impact of reducing water levels is a decrease in size of the wetland. This is especially true of shallow, low gradient wetlands which may be completely eliminated. Decrease in wetland size reduces the available wildlife habitat and the area of vegetation capable of nutrient assimilation. Decrease in wetland size also

reduces the water surface area, and corresponding ET and evaporation rates, which can have an influence on the rain cycle and regional climatic conditions.

Degradation of Fish and Wildlife Habitat

A decrease in wetland size reduces the available wildlife habitat. The accompanying changes in vegetative composition and diversity, and loss of aquatic productivity impacts the breeding and nesting areas for many species of wildlife.

Invasion by Exotic Plants

Invasion by exotic plants such as melaleuca and Brazilian pepper is encouraged by changes in the depth and/or duration of wetland water levels. Melaleuca adapts well to alternating flood and drought conditions, and can form thick, monotypic stands that have very little wildlife value. Melaleuca also exhibits a high rate of ET and is very tolerant of fires, sprouting readily from the root stock after burning. The threat from this aggressive and difficult to control species argues strongly against allowing any further decreases in water levels or hydroperiods in the wetlands.

Alteration of Historical Surface Water Flows

Changes in water levels can also affect surface water flow patterns within and between wetlands. Reductions of the amount of surface water flow from wetlands can also have a negative effect on the salinity balance in estuarine habitats. This can be detrimental to the productivity of seagrass beds, oyster bars, and other valuable coastal environments.

Soil Subsidence and Increase in Fire Potential

With the impact on wetland water budgets that occurs from wellfield drawdowns comes an increase in the frequency and severity of wildfires. Fires are part of the natural process that recycles nutrients from accumulated plant material back into the soil. Fires are prevalent in the dry season, especially during drought years. Normally, the soil remains wet almost to the surface, protecting the roots of wetland vegetation from damage. When the water table is depressed to unnaturally low levels, the muck soils that underlay many of South Florida's wetlands dry out and become flammable. Resulting muck fires kill natural wetland vegetation, which is replaced by less desirable, weedy species. Even in the absence of fire, overly drained muck oxidizes and degrades, which can lead to vegetation changes and degradation of wetland function.

Saltwater Intrusion

Wetlands in coastal areas may experience vegetative changes in response to salinity changes. For example, cypress, maple, and other freshwater species can be killed by increased salinity resulting from decreased inflows of fresh water. A potential solution

to this problem would be to establish minimum flows, which could lead to constraints on water supply development upstream.

Other Impacts

There are numerous other activities which affect wetlands that are outside the scope of this report, but may contribute to the cumulative impact on wetland systems (Larson, 1976; Carter et al., 1973; University of Florida, Center for Government Responsibility, 1982; Rochow, 1989; CH2M Hill, 1988): These activities include the following:

- Outright filling (conversion to residential, commercial, industrial, or agricultural uses)
- Drainage for pasture
- Rock mining
- Peat mining
- Chemical or biological pollution
- Impounding
- Dumping
- Recreational misuse and overuse
- Noise pollution

Impacts of Ground Water Drawdowns on Uplands

Little is currently known about the hydrologic requirements of upland communities. However, it is known that the water table levels beneath an upland play an important role in defining the vegetative structure and composition of an upland community. Impacts to uplands from water table withdrawals are similar to those encountered by wetlands, such as increased frequency of fire caused by reduced moisture conditions resulting from lower than normal water table elevations. Most natural environments in South Florida depend on appropriate fire regimes to maintain their ecological integrity. Those upland communities that are on the highest and lowest water tables may prove to be the most sensitive to water table level change. Monitoring of upland parameters is needed to provide a better understanding of wetlands.

Impacts of Ground Water Drawdowns on Estuarine and Marine Habitats

Although estuarine and marine habitats are not specifically addressed in the water supply model developed for the LWC Water Supply Plan, these sensitive environments need to be considered whenever management scenarios have the potential to affect freshwater releases to tidewater. The degree of salinity as well as volume, distribution, circulation, and temporal patterns of freshwater discharge all contribute to the character of

these systems. In many ways, salinity is a master ecological variable that controls important aspects of community structure and food web organization in coastal systems (Myers and Ewel, 1990). Salinity patterns affect productivity, reproduction cycles, population distribution, community composition, predator-prey interactions, and food web structure in the inshore marine habitat. Disruption of the food web resulting from a salinity imbalance would also have a detrimental impact on commercial and recreational fishing industries. Other aspects of water quality, such as turbidity, dissolved oxygen content, nutrient loads, and toxic constituents also affect functions of these areas (Environmental Coalition of Broward County, 1987; U.S. Department of Agriculture, 1989; Myers and Ewel, 1990).

Impacts on Wading Birds

The interior freshwater marshes of South Florida are important habitats because of their importance as feeding and nesting areas for a number of endangered or threatened species (wood stork, sandhill crane), or species of special concern (little blue heron, snowy egret, Louisiana heron, least bittern, limpkin). The future of these species is ultimately linked with maintaining healthy, viable wetland systems (Ogden, 1978).

Wading bird species commonly feed upon small fish (1 to 6 inches long) in waters typically 2 to 30 inches deep. Although wood storks and white ibis display different feeding techniques, both species are tactile foragers, meaning they feed by touching prey with their bill and swiftly snapping it shut to catch food. This specialized feeding technique requires a greater concentration of fish than needed by other wading birds, which feed primarily by sight. Therefore, wood stork and white ibis foraging success is affected in situations where total numbers of available fish are reduced as a result of wetland drainage or altered hydroperiods, as compared to wading bird species which feed primarily by sight.

Populations of wading birds have experienced large declines in South Florida. Factors which have led to decreased population levels include loss of habitat, alteration of historical water levels and hydroperiod, increased fire frequency, and overhunting. In some cases, species which inhabit wetland areas have been adversely affected by water management actions which were intended to provide for their protection.

Robertson and Kushlan (1974) estimated the total population of wading birds to be as high as 2.5 million in 1870, declining to less than 500,000 in 1910 as a result of plume hunting. Restrictive hunting legislation enabled populations to increase to an estimated 1.2 million by 1935. Since that time, total populations have declined to levels about 10 percent of the levels recorded during the 1930s (Collopy and Frederick, 1986). Ogden (1978) states that the rapid decline in wading bird populations over the last three to four decades is the result of repeated nesting failures caused by inadequate food production. This can be attributed to marshland destruction and altered hydroperiods. Lowered water levels cause shortened reproductive periods for fish and aquatic invertebrates, and increase the frequency of destructive fires. Unusually high water levels during the nesting

season cause food resources to be dispersed and unavailable during the critical nesting season.

The status of the endangered wood stork is of particular concern because it nests within the LWC Planning Area (Corkscrew Swamp). Historical populations of wood storks have sharply declined in South Florida. This decline is estimated to be about 80 percent between 1960 and 1980 (Ogden et al., 1987). Population levels averaged about 2000 pairs until 1960, although much variation occurred (Robertson and Kushlan, 1974; Ogden et al. 1987). Numbers continued to decline during the 1970s and 1980s after construction of water management structures which delivered water to Everglades National Park (Ogden et al., 1987). Ogden et al. (1987) has argued that the decline of wading bird populations within Everglades National Park was the result of alteration of the timing and distribution of surface water discharged into the Everglades since the 1960s. The authors indicate that the new water delivery schedule regime resulted in delayed and incomplete dry season drawdowns, which delayed wood stork nesting to the point where the nesting period extended into the wet season, and the adults could no longer obtain a sufficient concentrated food supply to support their young. Water management actions which allowed flood releases to the Everglades reversed the annual cycle of declining water levels and dispersed prey concentrations. Loss of peripheral wetlands, due to urban and agricultural development, is also thought to be the a major factor for nesting failures of many wading bird species.

Impacts on Rare, Threatened, or Endangered Species

Loss of habitat and habitat fragmentation are the major causes of the decline in a number of listed rare, threatened, or endangered (RTE) wildlife species in South Florida. Reduction in population is due largely to conversion of natural habitats to agricultural and urban uses. Some species, such as the Florida panther and black bear, require large expanses of land to successfully survive as a breeding population. Other species are restricted to one particular type of habitat, such as the Florida scrub jay (pine/oak scrub) or red-cockaded woodpecker (mature pine flatwoods). Listed RTE species within the LWC Planning Area depend on both wetland and upland communities for survival. For example, the Florida panther inhabits uplands, but it frequents wetlands. The reverse is true for other species, such as the wood stork.

Agricultural and urban development have gradually fragmented and reduced the quality and size of existing wildlife habitat. Continued fragmentation of upland and wetland ecosystems has the potential to cause problems for the survivorship of many species. **Table E-1** presents a list of the rare, threatened, and endangered species and species of special concern that are found within the LWC Planning Area. The following is a summary of selected species listed in the table.

Florida Panther (*Felis concolor coryi*)

A federally listed endangered species, the Florida panther has been given a high priority status to be saved through the Florida Panther Recovery plan (U.S. Fish and

Table E-1. Selected, Threatened, Endangered, and Species of Special Concern within the Lower West Coast Planning Area.

Species	FWC	USFWS
Amphibians and Reptiles		
American alligator *Alligator mississipiensis*	SSC	T(S/A)
Eastern indigo snake *Drymarchon coralis couperi*	T	T
Gopher frog *Rana aerolata*	SSC	UR2
Gopher tortoise *Gopher polyphemus*	SSC	UR2
Florida pine snake *Pituophis melanoleucus mugitus*	SSC	UR2
Birds		
Audubon's crested caracara *Polyborus planus audubonii*	T	T
Bald eagle *Haliaeetus leucocephalus*	T	E
Burrowing owl *Athene cunicularia*	SSC	
Florida sandhill crane *Grus canadensis pratensis*	T	
Florida scrub jay *Aphelocoma coerulescens*	T	T
Limpkin *Aramus guarauna*	SSC	
Little blue heron *Egretta caerulea*	SSC	
Osprey *Pandion haliaetus*	SSC (Monroe Co.)	
Red- cockaded woodpecker *Picoides borealis*	T	E
Roseate spoonbill *Ajaia ajaja*	SSC	
Snowy egret *Egretta thula*	SSC	
Southeastern American kestrel *Falco sparverius paulus*	T	UR2
Tricolored heron *Egretta tricolor*	SSC	
Wood stork *Mycteria americana*	E	E
Mammals		
Big Cypress fox squirrel *Sciurus niger avicennia*	T	UR2
Everglades mink *Mustela vison evergladensis*	T	UR2

Table E-1. (Continued) Selected, Threatened, Endangered, and Species of Special Concern within the Lower West Coast Planning Area.

Species	FWC	USFWS
Florida black bear *Ursus americana floridanus*	T	UR2
Florida mouse *Podomys floridanus*	SSC	UR2
Florida panther *Felis concolor coryi*	E	E
Round-tailed muskrat *Neofiber alleni*		UR2
West Indian manatee *Trichechus manatus*	E	E

E = Endangered.

T = Threatened.

SSC = Species of Special Concern.

UR2 = Under review for listing, but substantial evidence of biological vulnerability and/or threat is lacking.

T(S/A) = Threatened due to similarity of appearance.

Source: SWFRPC, 1990

Wildlife Service, 1987). The panther requires a large territorial range, which is rapidly disappearing due to the expansion of agricultural and urban developments. This continued "loss and fragmentation of native landscapes in Southwest Florida will reduce the ability of panthers to function normally and will exacerbate problems associated with low numbers" (Maehr, 1990). Maehr also observed that while wetlands are an important habitat to panthers, they appear to prefer native upland forest habitats in Southwest Florida. The survival of the panther is closely correlated to the preservation of large tracts of contiguous and suitable habitats. Additional habitat losses may be incurred by changes in the hydrology of wetlands and uplands due to drawdown effects from wellfield operations.

Red-Cockaded Woodpecker (*Picoides borealis*)

Also a federally listed endangered species, the red-cockaded woodpecker was once common in the region within mature pine forest habitat. However, logging for timber and clearing for agriculture has significantly reduced this habitat, affecting the woodpecker population size and range. This woodpecker is the only woodpecker species to excavate a nesting cavity in a mature living pine tree, and therefore requires a mature stand of pines for successful nesting. In addition, the woodpecker lives in groups, referred to as clans, that may be as large as nine individuals. Their territories vary in size up to 250 acres, with areas of utilization up to 1,000 acres. Soils which support mature pine forests are subject to conversion to agriculture and urban development. Hydrological changes from wellfield development may cause the further loss of pine forest habitat by increased fire frequency.

Florida Scrub Jay (*Aphelocoma coerulescens*)

The Florida scrub jay is a threatened species that lives within a very restricted habitat range, permanently residing in upland scrub communities. These scrub communities exist on historic sand dunes, and are vanishing due to urban developments and conversion to citrus groves. The protection of this habitat is critical for species survival.

Gopher Tortoise (*Gopherus polyphemus*)

A species of special concern, the gopher tortoise lives in a variety of habitats. The major cause for decline of tortoise populations has been the conversion of native habitat to agriculture and urban development. In the process of clearing the land, the tortoise is often killed by suffocation due to burial within their burrow. Highway mortality also significantly contributes the decline of this species in Lee County (Lee County, 1989). Gopher tortoise burrows are also utilized by over 80 different wildlife species, such as the Eastern indigo snake (threatened species) and the gopher frog (species of special concern).

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STRATEGIC LAND ACQUISITION/CONSERVATION/ PRESERVATION PLAN FOR SOUTHWEST FLORIDA (DRAFT)

*Note: This unmodified **DRAFT** document was forwarded to the SFWMD by David Burr, Planning Director, Southwest Florida Regional Planning Council (SWFRPC), February 1999.*

I. Background

The passage of the Environmentally Endangered Lands program in 1972 was Florida's first statewide acquisition program. This program was implemented due to the recognition that our natural resources were vital to our economy and quality of life, or sustainability. This recognition is demonstrated in "The Green Plan: A Basic Understanding of Florida's Resource Limitations as a Foundation for Land Use Planning" prepared by the Division of State Planning, Bureau of Comprehensive Planning, 1975. To gauge the "state of the region" near that time, Map 1 (*not available in this document*) is extracted from the SWFRPC "Land Use: Inventory and Issues, The Initial Element of the Land Use Policy Plan", June 1977, Open Space Land Map. This map depicts the major proposed public and private preserves at the time based on the "Green Plan" and additional regional planning. (Note that the Big Cypress and Fakahatchee Strand acquisition began after 1972 and that the Lykes Brothers Fisheating Creek was a voluntary private wildlife management area. Lykes has since removed this designation.

Since that time there have been a number of public and private initiatives, including the Federal purchase of Big Cypress, the Environmentally Endangered Lands (EEL) program (which related to the Florida Green Plan), the Conservation and Recreational land Program (CARL), and P-2000. These programs are inventoried and described later in this plan. Map 2 (*not available for this document*) depicts the current preserved or planned open space through the various programs.

As can be seen on the various maps we have made significant progress in preserving and conserving our strategic natural resources. What remains in the puzzle are the more remote natural resources that will receive future development pressure, smaller and more isolated rare and unique communities, and the links and connections between our existing preserves that form corridors and Greenways. In other words, our major regionally significant natural resources have been identified for acquisition, preservation or conservation within public and private acquisition programs and have been set aside within developments. Future work should include the connections of the dots and the filling of any gaps in the strategic system.

Also being recognized is that publicly sponsored acquisition programs can not alone provide for the sustainability of our natural resources, and that other tools are necessary. These tools include conservation easements, purchase of development rights, regulation and private initiatives. These tools and other tools are also presented in this plan.

At the April 15,1998 Southwest Florida Issues Group (Governor's Commission for a Sustainable South Florida Subcommittee) meeting, a series of presentations were provided by public and private conservation agencies and organizations regarding their land acquisition activities. Virtually every speaker responded in the affirmative to the question “Does Southwest Florida need a Strategic Acquisition Program/Plan?” The responses varied, but there was significant support even for the simple task of an annual convocation.

Consequently, continuing discussions are proposed for these agencies and organizations and guidance given to the topic of strategic acquisition of environmentally sensitive, and other targeted properties, with some evaluation of a minimum effort to the furthest extent of practicable effort. Any discussion should take into account the following:

- The basic structure of a strategy;
- The measurable outcomes that would be expected;
- The compatible and contradictory missions between the entities (recreation, hunting/fishing, flood control, forestry activities, etc.);
- Coordinated efforts in land (and water) resource identification for conservation;
- Fiscal flexibility and constraints;
- The variation in intensity of land management needed in the different acquisition programs;
- The extent to which strategically important parcels are still being lost for acquisition; and
- Broadening the fiscal value for which land are appraised.

Another expected outcome for this Convocation is a strong regional presence that will be coordinated to increase efficiency in natural resource protection and provide a plan of action that can quickly respond to the availability of funding and/or other initiatives.

Note: Identification of "Proposed Public Acquisition/Conservation/Preservation Lands" within this Plan is solely for planning purposes and not for regulatory purposes. Better, site specific data (if available) for any feature or resource shown on these lists or maps should be used to identify whether any natural resource of regional significance is in fact present on that site for purposes of preparation of local comprehensive plans and for consideration of site specific land use requests.

II. Goals, Objectives and Actions (To Be an Amendment to the Southwest Florida Regional Planning Council's Strategic Regional Policy Plan)

GOAL: BY 2020, SOUTHWEST FLORIDA WILL HAVE ALL LANDS ACQUIRED OR CONTAINED WITHIN A LAND CONSERVATION PROGRAM, WHICH INCLUDES A LONG TERM MANAGEMENT COMPONENT, TO INSURE SUSTAINABILITY OF OUR NATURAL RESOURCES AND QUALITY OF LIFE

OBJECTIVE: TO IDENTIFY AND INCLUDE WITHIN A LAND CONSERVATION OR ACQUISITION PROGRAM, THOSE LANDS IDENTIFIED AS BEING NECESSARY FOR THE SUSTAINABILITY OF SOUTHWEST FLORIDA, UTILIZING ALL LAND PRESERVATION TOOLS AVAILABLE.

ACTIONS:

- To help eliminate possible duplication or competition on a tract of land between entities, provide a clearinghouse and inventory of lands included in all land acquisition programs in a central location so various entities can see if any other entities were involved in a specific location. A future Web Site would be a useful tool and provide easy access.
- Support continued acquisition of lands targeted for conservation and recreation by Public Land Acquisition Programs including CARL, SOR, Florida Communities Trust, Lee County CLSAC, CREW, WRDA and other efforts in the Region.
- Support continued acquisition of lands targeted for conservation and recreation by Private Environmental Land Trust Programs in the Region.
- Facilitate and assist in the coordination of all land acquisition programs in the Southwest Florida Region by sponsoring periodic meetings of all public and private initiatives.
- Create a map depicting land that has been set aside for conservation purposes within approved developments (existing conservation easements).
- Create a map depicting regionally significant lands that private landowners agree will be voluntarily managed to maintain their environmental value, yet still provide them with economic benefits, without the need for public

acquisition consideration (such lands would be candidates for future conservation easements).

- Working with the various entities and utilizing the following Criteria and Guidelines, create a gaps planning map of land needed for recreation, hunting/fishing, flood control, forestry activities, etc.; to provide support for future populations and to protect existing ecosystems. Potential gaps may include lands which are not included in any current acquisition/conservation /preservation program, have not already been set aside as conservation areas within approved development or lands which may be within private ownership and may be potentially proposed for future agricultural or urban intensification, which would preclude their environmental value.
- Workings with the various acquisitions programs identified in this Plan and working with Local Governments and private landowners, develop a strategy to protect gaps lands identified in the above action, using the Tools outlined in this plan.
- Assist in the preparation of applications of existing programs for funding of land acquisitions for gaps lands shown on the above-mentioned planning map.
- Investigate the potential of forming a new Programs, Land Trusts, or encourage existing Land Trusts, to focus on land acquisition, and on other land conservation techniques within portions of Southwest Florida not currently within a program and depicted on the above mentioned gaps map.
- Because we do not have all the money necessary to acquire all lands needed, and because some methods may remove lands from needed ad valorem tax status, other methods rather than just fee simple acquisition are needed.
- Encourage citizen organizations within the Region to refocus on land conservation strategies as a proactive method in addressing environmental protection issues.
- Working with the various entities, refine existing Management Strategies to insure that the lands acquired are maintained in the natural condition that led to their preservation status.
- Incorporation of the plan into the Strategic Regional Policy Plan of the Southwest Florida Regional Planning Council.

III. Acquisition-Preservation-Conservation Criteria

A. Wetlands

Areas that are considered as wetlands. These include configurations of diverse ecosystems that are periodically inundated with fresh water; those areas where the water level is at, near, or above the land surface for at least 30 days of an average (rainfall) year. Examples include: Hydric Hammocks, Hydric Pine Flatwoods, Freshwater marshes, Wet Prairies, Floodplain Forests and Swamps, Cypress Sloughs, Strands and Domes, Wetlands adjacent to Lake Okeechobee and Wetlands that have value to assist in stormwater management and public water supply.

B. Unique Uplands and Other Natural Communities

Areas that represent the best remaining examples of each of the Region's unique Uplands and Natural Communities and their subtypes, with priority given to those communities or subtypes which have been designated by the Florida Natural Areas Inventory as Critically Imperiled, Imperiled, or Rare Natural Communities.

C. Fish and Wildlife

Areas that are critical to the survival of wildlife listed as endangered, threatened or species of special concern. Examples include: areas that serve as colonial bird nest sites, that are necessary to maintain the Region's native animal species diversity, that are used as large mammal corridors linking critical habitats, and areas that are documented as breeding or nesting sites for listed species.

D. Vascular Plants

Areas that contain habitat for rare, endangered, and threatened plant species, with priority given to those sites that are critical to their survival, or are not critical but contain important assemblages of rare or endangered species.

E. Freshwater Supplies

Areas that serve as protective buffers along Outstanding Florida Water rivers and lakes, protective buffers surrounding potable water wellfields. Areas that serve as protective buffers to Lake Okeechobee and that have been identified for acquisition as part of the Save Our Rivers, C.A.R.L., and P-2000 acquisition programs.

F. Coastal Resources

Areas that contain undeveloped portions of, or entire undeveloped Barrier Islands. Upland and wetland buffers to protect the Region's significant commercial and recreational saltwater fisheries, particularly those fisheries that are designated State Aquatic Preserves, National Estuarine or Marine Sanctuaries, Areas of Critical State

Concern, Outstanding Florida Waters, National Estuary Program, or Class II Shellfish Harvesting Areas.

G. Archaeological and Historic Resources

Lands that contain archaeological and historical sites that best typify the various cultural periods and regions of the state, the classes of cultural activity, the various styles of architecture, and the unique works of individuals.

H. Outdoors Recreational Resources

Areas that help meet needs identified in the Strategic Regional Policy Plan, and in Florida's Statewide Comprehensive Outdoor Recreation Plan. Areas that enhance the representational balance of natural and historic resources within the Region's Park system, or lands that contain prime examples of the state's natural and historical resources. Areas that serve as fish and wildlife oriented outdoor recreation areas. Areas that could assist in meeting Local Government Comprehensive Plan recreational level of service and concurrency requirements.

I. Forest Resources

Lands that maintain representation of the various forest or timber types of the Region; maintain Florida's forests to perpetuate their environmental, economic, aesthetic, and recreational values; give special consideration to manageable forests that have income producing potential to defray management costs; and give special consideration to upland forests that help meet the resource-based recreational needs of Florida's growing populations.

J. Geologic Features

Lands that contain prime examples of unique geological exposures, formations, and outcrops.

K. Other General Guidelines

Areas with resources of statewide or regional importance. Endangered and vulnerable lands and waters that are in immediate danger of loss to some other land use. Lands and waters with ecologically intact systems that have minimal disturbances, and can be feasibly managed to conserve the resource for which the lands to be acquired. Lands and waters that add inholdings, and other areas, that would enhance management or protection of existing state lands that have important resources. Lands and waters that have significant resource values, and satisfy specific regional concerns, with special consideration given to those projects that are accessible to urban areas. Areas that should be targeted due to repeated flooding, that are vulnerable to hurricane loss and that could require extensive disaster relief funds after a catastrophic event. Areas that provide connectivity to existing preserves, and provide wildlife and public greenway corridors.

IV. Regional Guidelines For Setting Land Acquisition, Conservation, Preservation Priorities

Existing and Proposed Public and Private Acquisition Programs contain lands that form important "Core Areas" for wildlife, water resource protection purposes, recreation, historic/archeological and other natural resource protection. In many cases, however, these lands are not interconnected, and in time will become more isolated from adjacent preserves unless a strategy for maintaining these connections is implemented. The following general guidelines are suggested:

1. Focus on the continued acquisition of lands within identified P 2000 (CARL, SOR, etc.) projects.
2. Fill in any Gaps in the P 2000 Projects and "Core Areas".
3. Focus on lands directly adjacent to P 2000 Projects and "Core Areas".
4. First consider lands that are not currently approved for urban development, citrus or mining.
5. Consider lands that are currently approved for urban, agriculture, or mining, if they are strategically located adjacent to "Core Areas", contain lands with outstanding natural resources that should be preserved, or contain lands that provide important connections to the "Core Areas" and adjacent conservation areas.

V. Florida Statewide Land Acquisition Plan (FLSAP): Land Acquisition Guidelines

1. Prefer projects with resources of statewide or regional importance.
2. Prefer the more endangered and vulnerable projects, which are in immediate danger of loss to some other use.
3. Prefer projects with ecologically intact systems that have minimal disturbances and can be feasibly managed to conserve the resources for which they are to be acquired.
4. Give special consideration to inholdings, additions and other lands that would enhance management, protection, or restoration of existing public lands with important natural or cultural resources.
5. Prefer projects with significant resource values that satisfy specific regional concerns, giving special consideration to projects that are accessible to urban areas.

6. Prefer projects that have sufficient size and resource diversity to support multiple-use management and resource-based outdoor recreation.
7. Give special consideration to habitat corridors or landscape linkages that serve a demonstrated Conservation or recreation purpose.
8. Give special consideration to large projects that exhibit wilderness characteristics.
9. Give special consideration to projects with acquisition or management assistance from other governmental or nonprofit entities if these projects also help to achieve other FSLAP objectives.

VI. Estero Bay Agency on Bay Management Gaps Map

The Estero Bay Agency on Bay Management (ABM) has prepared a proposed Land Conservation GAPS Map for the Estero Bay Basin (*following page*). A subcommittee of the ABM using the above criteria prepared the map. It is proposed that the SWRFPC work with similar groups to prepare a gaps map for the entire region.

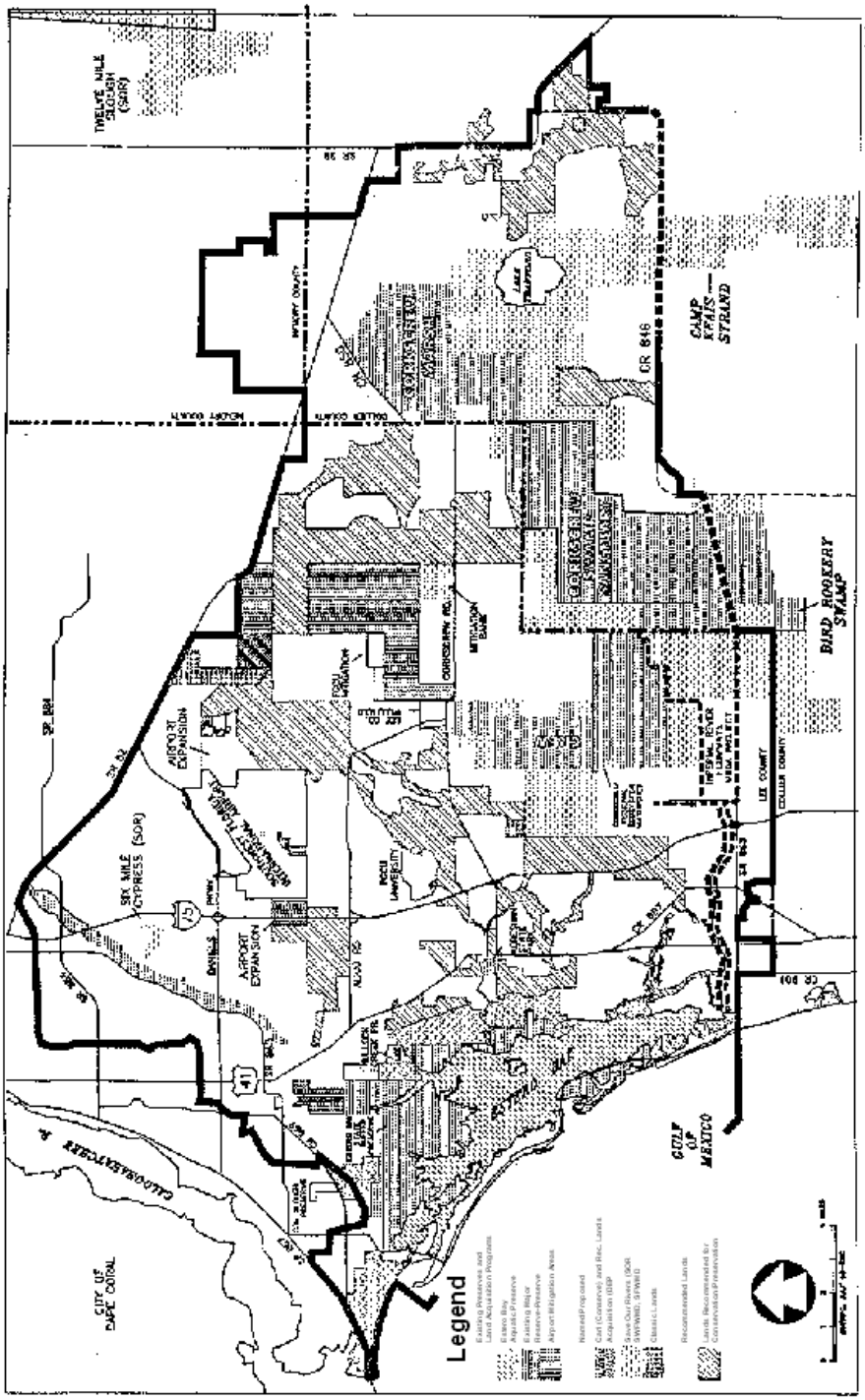
VII. Tools For Preservation\Acquisition\Conservation

A. Fee-simple

1. Outright Sale - The owner of a piece of property transfers the title of the land, with all rights commonly associated with property, to another party. This is the most common way for government agencies to purchase land. This is-also called Negotiated free market acquisition and outright purchase. For example, Preservation 2000.

   The advantages are; clearly will not have residential or other such development; no restrictions on type of management; and, potentially available for public recreation. The disadvantages include: high initial cost since purchasing entire property, including its potential value if it were to be developed; removes property from tax role; and, may not be funds for proper management.

2. Sale-Leaseback - A piece of land is sold, then the buyer leases it to the original owner. For example, the purchase of lands around airfield, which is then, leased back for agricultural activities. The advantage is clear control over use of property since


LAND CONSERVATION/PRESERVATION STRATEGY MAP
ESTERO BAY WATERSHED
ADOPTED JULY 13, 1998 BY THE ESTERO BAY AGENCY ON BAY MANAGEMENT
Legend
SIX MILE CYPRESS (SOR)
AIRPORT EXPANSION
CORKSCREW ROAD
CAMP KEAIS STRAND
BIRD ROOKERY SWAMP
GULF OF MEXICO
CITY OF NAPLES
LEE COUNTY
COLLIER COUNTY

other uses are restricted by terms of lease. The disadvantage is must still fund, upfront, the fair market value for entire parcel.

3. Sale-Sale Back - A piece of land is sold then sold back to the original owner or another buyer with restrictions.

4. Eminent Domain And Condemnation – The advantage is that this process ensures that the identified piece is actually bought. The disadvantage is that the process is non-voluntary and often results in legal actions that add to the overall cost of land acquisition.

5. Donations Of Land

   - Immediate donation.
   - Donation by bequest. Property transfers at death of owner. The advantages include reduction in income taxes for - immediate donation and donation with reserved life -estate; reduction in estate taxes for donation by bequest.
   - Life Estate. An estate whose duration is limited to the life of the party holding it, or some other person. Upon the death of the life tenant, the property (real or personal) will go to the holder of the remainder interest or to the grantor by reversion. This type of estate does not amount to ownership but denotes a claim or interest in the property, limited by a term of life.

6. Term Estate - An estate for years whereby a person has an interest in lands and tenements and a possession thereof, by virtue of such interest, for some fixed and determinate period of time; as in the case where lands are leased for a term of a certain number of years, agreed upon between the lessor and lessee. This type of estate is generally for a fixed and definite period of time; implying a period of time with some definite termination date.

7. Trade Agreements - Tax-deductible gifts of property that have low ecological value are sold in order to purchase more desirable natural areas. For example, corporations donate obsolete factory sites and land left over from development projects to The Nature Conservancy.

8. Land Exchanges With State Surplus Land - Private land is exchanged for state-owned land. The DEP Bureau of Land Management Services reviews proposals for swapping of private land (in areas targeted for acquisition) for lands declared surplus by the State.

9. "Like-Kind" Or "Third 'Party" Exchange - The owner of land who receives payment-for a conservation easement or fee-simple sale gives the money to a third party intermediary (usually

an attorney) who then purchases property of the owner's choosing for business, trade, or investment purposes. This is governed by Section 1031 of the Internal Revenue Code. The advantage is that the capital gains taxes are deferred until the acquired property is sold (rather than paying on the cash received).

B. Subsidies and Incentives

1. Voluntary Registration -This recognizes parties that manage their lands for natural resource purposes. Example programs are:

   - The National Institute for Urban Wildlife has a Urban Wildlife Sanctuary Program to certify and recognize lands that are managed for wildlife.
   - The Florida Department of Agriculture and Consumer Services presents annual awards to those who promote environmentally sensitive agricultural practices.
   - The Soil and Water Conservation District (in Dekalb County, IL) awards a certificate and a sign to honor farmers who are working to protect the resources.
   - The National Wildlife Federation recognizes people who consider wildlife when landscaping through their Backyard Wildlife Habitat Program.

   The advantage is that this makes landowner personally feel good about their efforts and, through community support, encourages other landowners to do the same.

2. Marketplace Incentives - Recognize and promote products that have been grown or produced in a manner that is not destructive to the environment. For example, the Florida Department of Agriculture certifies produce that has been grown organically.

3. Ecotourism - Use tourist potential for properties managed for natural resources. For example, the Babcock Wilderness Adventures offer tours on a ranch in Punta Gorda.

4. Payments and Credits

   - Cost-share programs for improvements. Provides public funding to improve the quality of the land. Examples are: NRCS funds changes in production to protect water quality through the Agricultural Water Quality Incentive Program; NRCS funds crop management to reduce application of pesticides and nitrogen through the Special Practice 53 Program; DEP funds projects for water quality through the

Nonpoint Source Management Program; and, U.S. Forest Service funds management of small forested parcels through the Forest Stewardship Program.

- One-time payments to implement conservation practices. For specific actions. Examples are: NRCS pays to stop growing crops on land subject to excessive erosion or contributes to water quality problems through the Conservation Reserve Program; NRCS pays to restore or preserve wetlands on their property through the Wetlands Reserve Program; and, DEP funds for the cost of removing fuel tanks under the Abandoned Tank Restoration Program.
- Compensation for damage by wildlife. Offered to owners who agree allow wildlife to roam on their property. For example, the Defenders of the Wildlife compensate farmers for verified livestock losses to wolves.
- Low-interest loans to continue agriculture use of land. Loans for family farms and low-income farmers to continue agricultural use of lands. Also loans to farmers who cannot secure enough funding to acquire agricultural land. The Consolidated Farm Services Agency administers the Federal programs. There are no state programs in Florida.
- Property Tax relief. Tax land at the current use (as farmland), not at the potential value if developed. Under Florida Statute 193.461 provides for a Florida Agricultural Use Assessment for lands in commercial agriculture.

Advantages are that the landowner immediately receives a "return" on the efforts to preserve natural resources. The disadvantage is that the programs are not perpetual.

5. Technical Assistance - Provides state-of-the-art research and other information to improve land management. For example, the American Farmland Trust has an Agricultural Economic Development Program in Palm Beach County to provide assistance in developing new products and job opportunities.
6. American Farmland Trust - The American Farmland Trust (AFT) is a private, nonprofit organization dedicated to conserving agricultural resources. AFT's mission is to stop the loss of productive farmland and promote farming practices that lead to a healthy environment. Its approach is a farmer-friendly mix of public education, on-farm demonstration projects and public policy development at the national, state and local levels. Since its establishment in 1980, AFT's professional staff has provided leadership and technical assistance on many issues related to agricultural resources conservation.

7. Florida Stewardship Foundation - The Florida Stewardship Foundation is working to:

   - Create a forum that will bring private landowners ... who own the vast majority of the state's land area ... are custodians of the largest repository of natural resources ... and hold majority interest in the remaining stock of Florida's future land uses ... together with government and environmental and natural resource conservation interests;
   - Create a statewide coalition of agriculture, forestry, government and conservation interests to pursue a new environmental ethic that will recognize private property rights, be inclusive of all interests and rely on "common sense" solutions and incentives to promote private stewardship of natural resources; and
   - Act as an intermediary and mediator between government agencies, conservation interests and private landowners in negotiating and consummating less-than-fee transactions and economic incentive programs that tie good stewardship decisions to good business decisions, encourage better cooperation between government agencies and private landowners, and promote private stewardship of natural resources.

C. Land Use and Regulatory

1. Conservation Easements - The owner transfers to another party one or several of the group of "rights" that go with land ownership to another. The owner retains the "rights" not transferred. The "rights" granted may be any of those that go with the land. For example, the owner may give up the right to construct a dock on a waterfront lot (one of the rights of riparian access). In some cases, there is a "right" to develop the property. Often this right is defined in local zoning/planning regulations and can be transferred. Organized programs can encourage such transfers as follows:

   - Transferable Development Rights (TDR) Program - The owner of a property may transfer development rights-from an area that the government wants to restrict development to another area. Development rights could be in the form of allowable number of residential units (density per acre). An easement is placed on the property to reflect the reduction in development rights. The owner may sell the development rights to another.
   - Purchasing Development Rights (APR) Program - Where the landowner will continue existing use of the land but

agrees not to change its use by development. An easement is placed on the property to reflect the reduction in development rights.

(i) Can be to maintain undeveloped use. For example, the Green Swamp Land Authority will pay landowners the difference between full market value and undeveloped value.

(ii) Can be to maintain agricultural use (also called Purchase of Agricultural Easements PACE). For example, Palm Beach County is considering starting a program within its Agricultural Reserve.

When donated, the landowner may deduct the value of the easement from taxes, but the IRS will look for assurance -that a conservation contribution will result in a substantial benefit to the public. The advantage is that this is less expensive than outright purchase. The disadvantages are: it is difficult to clearly defining the restrictions imposed by the easement; and, there is no clear method to place a value (purchase price) on the "right" thereby transferred.

2. Zoning - Through land use planning, properties are designated for types of use and density. The zoning plan can be refined in additional ways, as follows.

   - Performance Zoning. This sets up standards for site design rather than providing a detailed map. Some Florida counties have requirements for buffers from roads and criteria for providing a certain percentage of "open area" in the site plan.
   - Special Treatment Overlay. These are special interest restrictions that may cross other land-use boundaries. Some Florida counties have "special treatment" or "conservation" overlays for particular wetlands which impose requirements for additional approvals or constraints on development.

   The advantage is that these constraints are part of the overall comprehensive plan for the community and there is a formal process for public involvement.

3. Critical Areas Criteria - A watershed or similar area is identified and a group meets to develop criteria for development or other actions to support the needs of the area. One type of example is the National Estuary Program. Another is the ongoing EIS on growth in Southwest Florida. The advantage is that a coordinated vision of a region's needs is developed and links are formed for cooperation. The disadvantage is that compliance with the criteria is generally voluntary.

4. Land Management Plans - The landowner develops a plan for their property, with technical assistance from the government agency. Examples are as follows.

   - Habitat Conservation Plan. Landowners modifying habitat of federally listed species prepare a plan with assistance of FWS. An advantage is that the FWS may permit an "incidental take,, if a plan is implemented. Texas Parks and Wildlife Department is proposing a Cooperative Conservation Plan concept where several adjoining landowners would develop a single plan.
   - Whole Farm Plan. Purpose is to be a comprehensive plan covering all natural resources, including soil and water, to protect the landowner from piecemeal regulatory burdens. The FG&FWFC provides assistance in Southwest Florida, called All Farm Plans primarily focused on those with habitat for the Florida panther. The Suwannee River Water Management District intends to provide assistance and coordinate the different plans through a Forestry and Agriculture Resource Management Program.
   - Food Security Act Compliance Plan. Landowners who receive cost-sharing funding through the USDA are required to develop and implement these plans.

   An advantage is that the plan will be the result of a comprehensive look at an agricultural operation, including a balancing of the needs for the operation against natural resources. The disadvantage is that its success is generally based on the level of voluntary -effort by the landowner and the amount of technical assistance that is available from the government agency.

5. Regulatory Reform - These are changes in the process that result in coordinated and quicker regulatory review (and thereby reduce the costs to the landowner in obtaining permits) in exchange for increased protection of natural resources. The advantage is less money is spent in the "process" and so it can be spend directly on the natural resource. The disadvantage is that this requires a high level of cooperation and trust between the landowner and agencies and between agencies.

6. Advanced Identification of Disposal Areas (ADIDs) - Identifies wetlands of higher value that would or would not be suitable for development. Advantage is that it informs the landowner or potential landowner of agency concerns. Disadvantage is that it is focused on wetlands, not the entire ecosystem.

7. Special Area Management Plans (SAMPs) - Identifies areas of importance and develops plans and criteria for review of regulatory permits. Advantage is that it is a mechanism to involve the views of the landowners outside of the tension of a permit review process. Disadvantage is that it is a non-binding document.

8. Florida Statute Chapter 380 - This chapter includes several processes for natural resource planning:

   - Resource Planning and Management Committees. The Governor appoints a group that, in 12 months, will either adopt a proposed voluntary resource planning and management program for a particular area under study or recommend that such a plan not be adopted. The purpose is to organize an effort to resolve existing and prevent future problems, which may endanger resources in the area. One committee was created for the Charlotte Harbor region, which resulted in a Plan adopted by the Governor and Cabinet in 1981. The Kissimmee River had a similar committee established.

   - Areas of Critical State Concern. The State by rule designates a geographic area. The rule includes a detailed boundary of the area, principles guiding development, a statement of purpose for the designation, a checklist of actions which, when implemented, will result in removal of the designation, and a list of issues or programs to assure ongoing implementation. Areas currently designated include the Big Cypress, Green Swamp, Florida Bay, and Apalachicola Bay.

   - Developments of Regional Impact (DRIs). Projects that will have regional impact to resources, natural as well as transportation, utility, and other infrastructure, undergo a comprehensive review process by the Regional Planning Councils.

   - Special Agreements. (Section 380.032(3)). The DCA can enter into agreements with any landowner, developer, or government agency as may be necessary to effect the purposes of Section 380.

   The advantage is that this formal process involving the State. The process is not restricted to a single resource but can look at an area comprehensively. The process also provides for review of issues that extend beyond jurisdictional boundaries. The disadvantage is the perception that this creates yet another level of government review for projects.

9. Local Government Comprehensive Plans - Each local government is required to prepare a plan that addresses use of land and the infrastructure and other needs of the community. The plans are reviewed by DCA for compliance with 9J-5 FAC. The Local Government submits a status report every five years called an Evaluation and Appraisal Report (EAR). The advantage is that this mechanism provides for a comprehensive view of the conflicts between growth and resources and provides for an extensive public participation process. Most Plans discourage development of wetlands by assigning low densities to these lands. Other Plans utilize different methods to control impacts such as:

    - Monroe County has a Rate of Growth Ordinance (ROGO) that assigns a quota of allowable new residential units by geographic area. An application for a building permit is scored based on the natural resources to be impacted, availability of utilities, etc.. The score is used to rank the permit applications, the higher ranking applications will receive a permit until the quota is used up.
    - Monroe County has a County Land Acquisition Authority that: purchases property for which building permits have been denied due to concerns for natural resource; purchases lands that have high potential for development (presence of roads, etc.) but with potential for restoration or protection of natural resources; and, to seek large blocks of funds for purchase of environmentally sensitive tracts of lands.
    - As part of the U.S. 1 widening for the Florida Keys, there is discussion of funding an Environmental Carrying Capacity Study that would look at how much development can be supported without detriment to the natural resources. The ROGO discussed above is currently based only on hurricane evacuation times. This study would identify other limiting factors.

10. Surface Water Improvement and Management (SWIM) - A study of a particular watershed to determine the needs for the preservation and restoration of the receiving waterbody. Advantage is that these are generally very thorough and technically based. The disadvantage is that the emphasis is only on one aspect of the ecosystem.

11. Permit Issuance/Denial - The Corps, DEP, WMDS, and Counties can deny a permit if it is contrary to the public interest or if it does not comply with the 404(b)(1) Guidelines or other criteria. Advantage is that it is a comprehensive look at a project's impact and generally results in a balance between the need of

the development and the natural resource. Disadvantage is that information and commitments outside of the applicant's property and control are not available, except through poorly defined cumulative and secondary impact analysis/restrictions.

D. Financing

1. Mitigation Banking - A geographic area is identified and a restoration and management plan is developed for the natural resources. This is the "bank". Projects that impact natural resources in the region are permitted to give money to the "bank" in lieu of funding restoration work within the project site. The restoration within the "bank" is given some units of measurement (typically, acres). As the restoration takes place, the bank generates "credits". The developer of the project to be permitted purchases these credits in lieu of on-site restoration. The advantage is that restoration takes place in a contiguous area rather than spread over several different properties. Also, since there is a finite amount of money available for restoration, this places that money in the most regionally important locations. The disadvantage is that it is very difficult to calculate the ecological value of the "credits". The Institute for Water Resources, in a report, also notes that an entrepreneur could establish a bank for the purpose of earning a profit from the sale of these "credits", a process they term Private Credit Market. Florida Wetlandsbank, Inc., is doing this in Broward County.

2. Private Initiatives - Private groups solicit funds for land acquisition and restoration projects. Examples are the Trust for Public Lands and the CREW Trust. The advantage is that they tend to increase knowledge of the need through advertising and corporate/community contacts.' They also provide a conduit for corporate and private donations.

3. Tax Funding of Acquisition - Specific tax is imposed dedicated to the purchase of lands. The P2000 program is supported by a document stamp tax. Monroe County currently spends money for natural resource protection from the proceeds of the Tourist Impact Tax (F.S. 125.0108). Other Counties have established programs such as the Lee County Conservation 2020 program. Additionally, other Counties have dedicated tax revenues toward land acquisition such as the Carlton Reserve in Sarasota County and the contribution towards the purchase of the Fairway Woodlands DRI project in Charlotte County.

4. Toll Road - Directing revenues to fund non-transportation restoration efforts. Tolls currently can go to the direct cost of maintaining the roads, compensatory mitigation for direct impacts to

natural resources, and, under the Intermodal Surface Transportation Efficiency Act (ISTEA), can include landscaping and mitigation of such impacts as noise on surrounding neighborhoods. There is a pending bill in Congress to authorize tolls from Alligator Alley to be placed in the Everglades Restoration Fund.

VIII. Existing Acquisition Programs within Southwest Florida

Map 2 is the Regionally Significant Natural Resources Map prepared for the Strategic Regional Policy Plan for the Southwest Florida Region. It locates the various lands identified in this section.

A. Federal Programs

1. *National Parks.* Yellowstone, which was created in 1872 in the administration of President Grant, was the first national park in the US (and in the world). The National Park Service Act (1916) created the world's first National Park system. Florida has three National Parks: Biscayne, Everglades and Dry Tortugas.

2. *National Wildlife Refuges*. The first national wildlife refuge was at Pelican Island in the Indian River on the Florida Atlantic Coast. President Theodore Roosevelt, visiting the site in 1903, was impressed by the abundance of brown pelicans. Upon learning that the island was Federal government property, he declared it a wildlife refuge by executive order. There are five National Wildlife Refuges in Southwest Florida. The J. N. "Ding" Darling NWR on Sanibel Island (6,000 acres), created in 1954 and named after a crusading newspaper cartoonist from Iowa who agitated for the protection of wildlife, is one of the most-visited of the national refuges, drawing approximately 250,000 visitors every year to see wildlife in a well-protected, but highly visible, setting. The Matlacha Pass (500 acres), Pine Island (500 acres) and Caloosahatchee (one small island) NWRs in Lee County and the Island Bay (23 acres) Charlotte County—are managed by the Ding Darling staff. The 24,000-acre Florida Panther NWR in Collier County, which is a component of the Big Cypress, and the 19,000-acre Ten Thousand Islands NWR, also in Collier, have their own management

3. *Pittman-Robertson Act.* The Federal Aid in Wildlife Restoration Act of 1937, better known as the Pittman-Robertson Act, has forged a long-lasting partnership between the Federal government and the states to protect wildlife resources. The Federal government reimburses up to 75 percent of the costs associated with a wildlife restoration project, drawing its revenues from an

11 percent excise on the sale of sporting arms. In the first 53 years of the program's existence, Pittman-Robertson funds purchased more than 5 million acres of land nationwide. The Babcock-Webb Wildlife Management Area in Charlotte County is a Pittman-Robertson project.

4. *Dingell-Johnson Act*. Adopted in 1950, this act of Congress imposed an excise on fishing equipment and motorboat fuels to support the restoration of sport fish habitat.

5. *Land and Water Conservation Fund.* This Great Society program, promoting open space and parkland development, was adopted in 1965. LWCF matches Federal dollars with local funds to build and enhance parks and natural areas. Several parks in Southwest Florida have been developed with LWCF assistance. One example is John Pennington Park, a patch of riverfront open space in Charlotte County.

6. *Everglades National Park*. Authorized by Congress in 1934, and dedicated by President Truman, who motored from Key West to Everglades City in 1947, this park has grown to more than 1,500,000 acres, drawing approximately 1,000,000 visitors annually. This was the first national park, which was not carved from existing Federal lands. Since that time, a few other parks have been acquired from private purchases (e.g. Great Smoky Mountains, Shenandoah) or from state donations (Big Bend NP in Texas), but most of the national parks were Federal public land to begin with.

7. *Big Cypress National Preserve*. This 728,000-acre preserve is by far the largest public holding of land in Southwest Florida. It protects vast tracts of wetlands, including cypress strands and domes, and provides free-range habitat for the critically endangered Florida Panther. State and national attention was first focused on the Big Cypress in the late 1960s when the Miami-Dade Jetport was almost built on a 38-square mile tract of the Big Cypress in Eastern Collier. (The Nixon administration scrapped Federal government support for the project in 1970, but not until one complete runway was finished.) The Big Cypress National Preserve is not a national park like the Everglades—it is managed for multiple uses, including hunting and the extraction of oil and gas. In the quarter-century since the original purchases were made other Federal and state programs have taken place and are underway within the basin, including the Fakahatchee Strand, South Golden Gate, the Okaloacoochee Strand and the adjacent National Refuges mentioned above.

B. State Programs

1. *Five percent excise on bathing suits*. Adopted in 1964, this was Florida's first program, which linked land acquisition with a revenue source.

2. *Environmentally Endangered Lands (EEL).* A $240 million program which was approved by Florida voters in a 1972 referendum. $200 million were dedicated to environmental lands and $40 million to recreational lands. Among the first EEL acquisitions were Cayo Costa Island in Lee County and the Charlotte Harbor State Preserve in Charlotte and Lee Counties. The principal revenue source was a tax on phosphate extractions. In the late 1970s, following a minor scandal concerning appraisal practices, the Florida Legislature replaced EEL with a new program.

3. *Conservation & Recreation Lands.* Established in 1979 as the successor to the EEL program, CARL—with its notoriously rigorous standards of property appraisal and valuation—has become the workhorse of state-funded environmental land acquisition programs in Florida. Since 1990, it has also been the centerpiece of Preservation 2000. These tend to be large-tract, high dollar purchases, and they are frequently linked to other acquisition projects. So far, CARL and EEL combined have acquired more than one million acres of land statewide at a staggering $1.5 *billion* dollars. No other state program in recent decades has rivaled the effectiveness of this program.

4. *Save Our Rivers, Save Our Coasts, and Save Our Everglades.* These three programs, with total authorized funding of $800 million, were created in 1982 and 1983 during the administration of Governor Graham. Save Our Coasts has been used to improve beach access in Southwest Florida; Save Our Everglades has been a major source of funding for the acquisition of South Golden Gate; Save Our Rivers funds have been used to acquire several tracts in the Region.

5. *Preservation 2000.* Created in 1990 by a Democratic legislature and signed by Bob Martinez on May 28, 1991, this umbrella program combined CARL with the three "Save Our" programs and the newly created Florida Communities Trust to form a ten year, $3 *billion* package of land acquisition. The funding source is a documentary stamp tax on the sale and transfer of land. After eight years of operation, P-2000 is nearing the end of its cycle. Funds are allocated to various land acquisitions programs as follows:

Program	Percent
Conservation and Recreation Lands Program	50.0%
Water Management Lands Program (Save Our Rivers, Surface Water Improvement and Management)	30.0%
Florida Communities Trust Program	10.0%
Division of Recreation and Parks for inholdings and additions	2.9%
Game and Freshwater Fish Commission for inholdings and additions	2.9%
Division of Forestry for inholdings and additions	2.9%
Department of Environmental Protection for recreational trails programs	1.3%

Note: Amounts may change for legislative set-asides for other purposes.

6. *Florida Communities Trust.* This program was created in 1990 as a part of the P-2000 package. FCT is similar to CARL, but it encourages the use of local matching funds, and has something of a recreational orientation. Its methods of land appraisal and valuation are not as exacting as those of CARL.

C. State Acquisitions in Southwest Florida

1. *Cayo Costa/North Captiva (Lee).* Cayo Costa and North Captiva are among the largest of the barrier islands, which form the outer limits of Charlotte Harbor. This was one of EEL's first acquisitions in the early 1970s, and it has been on the CARL list since 1980. So far, the State of Florida has acquired 1,692 acres of land at a cost of $20,400,000. An additional 240 acres, with an estimated tax valuation of $3,800,000 remain. Cayo Costa is now a state park, albeit one which is accessible only by private boat and offers few amenities. The few who do visit are treated to a view of the barrier island beaches as they existed years ago.
2. *Charlotte Harbor (Lee/Charlotte).* This is another EEL project. The first round of acquisition took place in 1977 and 1978 when General Development Corporation sold 16,000 acres of wetlands to the state for $5.1 million. Charlotte Harbor has been on the CARL list since 1986. This project consists of several large

tracts of wetlands which were once scheduled for development by General Development Corporation (south of present-day Port Charlotte); Punta Gorda Isles (south of the city of Punta Gorda); and Rotonda Corporation (on the Cape Haze peninsula). It includes the 900-acre parcel on which the popular Charlotte Harbor Environmental Center (CHEC) is located.

3. *Fakahatchee Strand aka Remuda Ranch (Collier).* Remuda Ranch was the brainchild of Milt Mendelsohn, protégé of the Rosen Brothers, developers of Cape Coral. In February 1966, the Rosens purchased 68,267 acres of land. Installment buyers in turn bought lots (typically 1.25 acres at $1,250 each) for which they received membership in a resort club which offered outdoor recreation—camping, hunting, skeet shooting, tennis and the like. Lot buyers were not promised (in writing, at least) the right to build a single family dwelling unit or anything else, which is fortunate considering that most of the site was underwater most of the year. The Fakahatchee is, in the words of the Florida Department of Environmental Protection (DEP), "probably the best example of strand swamp found in the United States." It is a vital hydrologic link between the Everglades system and the Ten Thousand Islands which contains, among other features, the largest assortment of native orchids in North America. In 1972, faced with pressure from the Federal Trade Commission, GAC—the Rosens' successor—halted sales at Remuda Ranch. Since then, approximately 66,000 acres have been acquired through EEL and CARL funds or through litigation. The purchase area includes some parcels, which were not included in the Remuda Ranch project. An additional 8,500 acres remain to be acquired one lot at a time. The Fakahatchee is a state preserve, and does not allow some of the uses that are permitted in the Federal Big Cypress, including hunting and off-road vehicles.

4. *South Golden Gate aka Picayune State Forest (Collier).* The Rosen Brothers billed this project, which is located generally west of Remuda Ranch, as "the world's largest subdivision." The Rosens purchased 112,000 acres (or 175 square miles, larger than the combined area of the cities of Pittsburgh, Washington, and Minneapolis), which they subdivided into a host of large lots—five acres was typical. In a scheme, which ran contrary to all of the standard assumptions of good planning, purchasers were encouraged to become small-time developers by subdividing their lots and selling them to other buyers. This low-lying link between the Fakahatchee and the Ten Thousands is now the subject of vigorous acquisition efforts, jointly funded by the State and Federal governments. In June 1997, Vice President Al Gore, in a visit to Everglades National Park, announced

that the Federal government would provide a $25 million match to the $25 million already committed by the Save Our Everglades to purchase 31,000 acres, divided into 12,000 lots.

5. *Charlotte Flatwoods (Charlotte/Lee).* The CARL list refers to this 18,700-acre site as the Charlotte *Harbor* Flatwoods; it is also called the "Yucca Pens," harking back to its past use as cattle range. This project, which began as a joint initiative of the Charlotte County Planning Department, the Florida Game and Freshwater Fish Commission, and the (now defunct) Lee County Department of Environmental Sciences, has been on the CARL list since 1992. Slash pine dominate the site which links the Webb-Babcock area with the coastal wetlands, including the southern tip of the Charlotte Harbor Buffer Preserve. It contains habitat for Florida panther, black bear, red-cockaded woodpecker, and the beautiful pawpaw, an endangered plant. When completed, this acquisition will provide corridors for wildlife, and will form a "sprawl stopper" on the Gulf Coast, assuring an open space break between Fort Myers/Cape Coral to the south and Punta Gorda/Port Charlotte to the north. So far, more than 4,000 acres have been acquired at a cost of $10,265,940.

6. *Estero Bay Aquatic Preserve and Buffer Reserve (Lee).* Millions of tourists have seen Estero Bay, even if they see it only from the bridge as they travel to and from Estero Island (Fort Myers Beach). One of Florida's most productive estuaries, this project has been on the CARL list since 1985. The Nature Conservancy donated the first component, a 316-acre parcel, in 1986. Since then, nearly 6,500 acres have been acquired at a cost of $7,700,000. More than 9,000 acres remain to be purchased. The Estero Bay Aquatic Preserve is about 10,000 acres and the Buffer Reserve is about 6,500 acres.

7. *Oscar Scherer Addition (Sarasota).* Another CARL acquisition, this 922-acre addition to Oscar Scherer State Recreation Area was purchased in 1991 at a cost of $11,800,000. The well-drained site includes about 400 acres of scrub land, which is prime habitat for the threatened Florida and commensal species. A five-mile nature trail gives the public an opportunity to experience the gregarious jays.

8. *Pineland Site (Lee).* Sixteen miles from its northernmost to southernmost point, Pine Island is the largest island along the Gulf Coast. Centuries ago, Pineland was the center of the thriving Calusa culture. The Pineland site, which is adjacent to a portion of the Charlotte Harbor Aquatic Preserve, contains midden mounds, a burial mound, and an ancient man-made canal, all of which are the objects of intensive archaeological study by

the Florida Museum of Natural History, under the direction of Professor William Marquardt. This is a 250-acre project. A 56-acre parcel, the "Randall tract", has already been donated to the University of Florida Foundation, which pledges that all proceeds of the sale of the property will be given to the Randall Research Endowment Fund for the management of the tract. The Pineland Site Complex has been on the CARL list since 1996. So far, only one purchase (of less than one acre) has taken place.

9. *Myakka Estuary (Sarasota and Charlotte).* This project has been on the CARL list since 1994. In 1995, the Southwest Florida Water Management District acquired more than 9,000 acres in the southwestern portion of the city of North Port, at a cost of $6,700,000 from Atlantic Gulf Corporation (AGC), the successor of the bankrupt General Development Corporation, which originally subdivided and marketed North Port. More than 4,500 acres remain to be acquired.

10. *Okaloacoochee Slough (Hendry/Collier).* The 29,000-acre Okaloacoochee Slough is the major headwater to the Fakahatchee and to the Big Cypress. This largely undisturbed tract contains more than 11,000 acres of mostly undisturbed wetlands. The Save Our Everglades program was the principal funding source for this acquisition.

11. *Rookery Bay National Estuarine Research Reserve (Collier).* This project includes Cannon, Johnson, and Keewaydin Islands. A CARL project since 1980, the State of Florida has so far acquired more than 10,000 acres at a price in excess of $33,000,000. It is now on the CARL "substantially complete" list. According to Judy Haner of the Florida Department of Environmental Protection, Rookery Bay has had the status of a national estuarine research reserve—one of 22 nationwide—since 1978. The site was established as a partnership between the Audubon Society and the Conservancy of Collier County, as it was then known. This partnership was responsible for the purchase of the first 6,000 acres. The Florida Department of Environmental Protection and jointly administers Rookery Bay with the National Oceanographic and Atmospheric Administration (NOAA).

12. *Belle Meade* (Collier). This 19,000-acre project was third on the 1997 CARL list. Lying to the west of South Golden Gate Estates, and north of Collier-Seminole State Park, Belle Meade is the primary watershed for Henderson Creek, the main tributary to Rookery Bay *(q.v).* The properties within the acquisition zone are typically small lots (most are 40 acres or less) in the possession of approximately 800 landowners. The land is

zoned for agricultural use, and there is a scattering of single family residences, plant nurseries, and groves. Although the acquisition area has experienced some encroachment from exotic plant species, especially melaleuca, there are few roads and other drainage alterations, in stark contrast to South Golden Gate Estates. Acquisition has moved quickly—more than 9,000 acres have been purchased under the CARL program at a cost in excess of $12,000,000. In December, the Governor and Cabinet are expected to authorize the purchase of an additional 2,670 acres.

13. *FDEP Recreation and Parks* District 4 Florida Park Service ranges from Citrus County down to Collier County. This district has 30 units under their purview, the one of the largest being the Fakahatchee Strand.

D. Local Initiatives

1. *Lee County.* A 2000-acre strand swamp, which parallels the course of the Caloosahatchee River, the Six Mile Cypress Slough is really 9.2 miles in length. Acquisition was very much a grass-roots effort. In the mid-1970s, after the Slough failed to make the EEL list, the cause of the Six Mile Cypress was enthusiastically adopted by students in the Lee County Environmental Education program, under the direction of educator William Hammond. After a spirited campaign, voters approved a .2-mil, two-year tax for acquisition of the tract in November 1976. The acquisition effort moved slowly until the early 1980s, when $2 million of Save Our Rivers funds, administered by the South Florida Water Management District, were added. The acquisition area has since been expanded to 2,200 acres. One popular feature of the Slough is the mile-long boardwalk, which is used by about 20,000 visitors annually. The Conservation 2020 Program adopted by voters in 1996, this initiative could generate as much as $77 million over a five-year period. Many of the lands being considered are already on the CARL lists.

2. *Charlotte County.* Charlotte County has acquired a former DRI known as Fairway Woodlands of about 468 acres adjacent to the Charlotte Harbor Flatwoods CARL project, Cedar Point, an 88 acre peninsula next to Lemon Bay used for passive recreation and outdoor education and contains 4 eagles nests and Tippicanoe Scrub and Amberjack Slough. The County does have some conservation easements near Boca Grande and have given easements to the FGFWFC near the East Water Treatment plant. These tracts were identified by the Charlotte County advisory

group known as the Environmental Lands Acquisition Advisory Council.

3. *CREW (Lee/Collier).* Created in 1989, the Corkscrew Regional Ecosystem Watershed is a 60,000-acre project surrounding the Corkscrew Sanctuary. In the mid-1980s, after several years of low rainfall, Lee County was motivated to apply for funds from the Save Our Rivers program administered by the South Florida Water Management District (SFWMD) to acquire the 15,000-acre Flint Pen Strand. The Corkscrew Sanctuary filed a separate application for lands within Collier County. SFWMD, hoping to acquire watershed lands in both counties as a unified project, created the CREW Trust, composed of representatives of several public and private agencies, to coordinate land acquisition, management, and public use. According to CREW's Ellen Lindblad, approximately 21,000 acres have already been purchased from four major funding sources—SFWMD (which will be the ultimate manager of the project), Lee County, the Big Cypress National Preserve, and CARL. The Florida Game and Freshwater Fish Commission is now preparing a management plan for the area. Hunting *may* be permitted in the future, but four-wheeling will probably continue to be prohibited. A five-mile hiking trail was completed in 1994.

4. *Sarasota County.* Starting in 1993, a citizens advisory group, known as the Environmentally Sensitive Lands Advisory Committee, began a mapping process to identify environmentally sensitive lands that should remain undeveloped. This program prohibits property taking and directed that all dealing with landowners would be on a voluntary basis. The mapping process has been completed. On March 9, 1999 voters of Sarasota County will vote on a referendum to increase ad valorem property tax by not more than .25 mill for 20 years.

E. Private Initiatives

1. *Conservancy of Southwest Florida (Collier-based).* Founded in 1964 to spearhead the acquisition of lands in Rookery Bay, this 5,300-plus member not-for-profit organization has been helping with the acquisition of South Golden Gate since 1991. Among other projects, the Conservancy has assisted the State at Collier County tax deed sales since 1994. Education is a major emphasis of the Conservancy, which maintains two nature centers—in Naples and at the Rookery Bay National Estuarine Research Reserve.

2. *Calusa Nature Center and Planetarium (Lee).* The Nature Center started in 1965 as a Junior League Project and was opened to

the public in 1977. The city of Fort Myers owns the property, which receives between 80,000 and 100,000 visitors annually.

3. *Corkscrew Sanctuary/National Audubon Society (Collier).* The newly formed National Audubon Society hired Guy Bradley, a Floridian, as a wildlife ranger to protect birds from plume hunters. When he was murdered in 1905, wildlife protection suddenly became a national *cause celebre.* The Audubon Society has maintained a warden station at the site since 1913. In 1954, Audubon acquired the first part of its 10,000-acre sanctuary. Corkscrew draws approximately 100,000 visitors annually, many of whom pause to photograph the extraordinary wildlife which can be found along the boardwalk which cuts through the cypress swamp, a very visible habitat for alligators, wood stork, river otter, and a host of other species. Well-staffed and immaculately maintained, Corkscrew demonstrates that private, not-for-profit management of natural resources can be just as effective as management by a public agency.

4. *Sanibel-Captiva Conservation Foundation (Lee).* Created in 1967, the Foundation has grown to more than 2,500 members, according to Kevin Lollar of the Fort Myers *News-Press.* The Foundation has acquired 1,178 acres at a cost of $2.55 million, and has received 563 acres of donated land. The Nature Center, which includes a four mile nature trail, a native plant nursery, and a butterfly house, draws approximately 15,000 visitors annually.

5. *Calusa Land Trust.* Trust began in about 1976 to buy sensitive lands around the Pine Island area and currently have almost 600 members and own approximately 1,100 acres. Their holdings are in a GIS system. Lands have been donated or purchased fee simple. Currently we are working with FDEP and the Pine Island Water Association to provide management of lands. Volunteers do much of the work.

Others to be contacted:

GICIA	Misty Nabors
The Nature Conservancy	Bob Burns
Trust for Public Lands	Dale Allen
SW Fla Land Preservation Trust	Cher Compton
Myakka River Conservancy	Julie Morris
Buckingham Conservancy	Dick Workman
Lemon Bay Conservancy	Sydney Crampton
North Captiva Group	Gary Walker

IX. Strategic Regional Land Acquisition Contacts

Federal Agencies	
USF&WS	Lou Hinds Andy Eller Kim Dryden
USACOE	Chip Clough, or Bob Barron
State Agencies	
FDEP	Heather Stafford Bob Reppening Gary Lytton Ken Alverez
FGFWFC	Jim Beever
Regional Agencies	
SFWMD	Chip Merriam, or Jacque Rippe
SWFWMD	Steve Minnis
CREW	Ellen Lindblad
East County Water Control Dist.	Peg Weatherford
Local Governments	
Charlotte County	Bill Byle
Lee Co./ CLASSAC	John Cassani Lynda Riley John Wilson
City of Ft. Myers	John Kremski, or Bill Mankin
City of Cape Coral	Rick Sosnowski

City of Sanibel	Rob Loflin
Town of Fort Myers Beach	John Gucciardo
Collier County	Vince Cautero
City of Naples	Jon Staiger
Sarasota County	Gary Comp
Hendry County	Jim LaRue
Glades County	Jim Threewits

Organizations

Audubon	Ed Carlson
Calusa Land Trust	Peter Ordway
Sanibel-Captiva Cons. Found.	Eric Lindblad
Conservancy of SW Fla.	Mike Simonik
GICIA	Misty Nabors
The Nature Conservancy	Bob Burns
Trust for Public Lands	Dale Allen
SW Fla Land Preservation Trust	Cher Compton
Myakka River Conservancy	Julie Morris
National Wildlife Federation	Kris Thoemke
Buckingham Conservancy	Dick Workman
Lemon Bay Conservancy	Sydney Crampton
North Captiva Group	Gary Walker

X. References

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Bob Barron, U.S. Army Corps of Engineers, (904) 232-2203.

"Alternative Methods of Land Acquisition", Southwest Florida Water Management District, Less than Fee Acquisition Team